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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/826,021
Filing Date: April 16, 2004
Appellant(s): TIOTANTRA ET AL.

David C. Bohn, Reg. No. 32,015
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 29, 2008 appealing from the Office action mailed February 20, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2004/0252397	Hodge et al.	12-2004
6,928.039	Millikan et al.	08-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hodge et al., U.S. Pub. No. 2004/0252397 ("Hodge"), in view of Millikan et al., U.S. Patent No. 6,928,039 ("Millikan").

As per claim 1, Hodge teaches a data streaming system, comprising:

a data storage device providing an intermittent read data stream (figs 1A&B and 5, disk drive 104 or 504; par. 0032); the data storage device also including an environment sensor and altering the frequency of cache refresh operations as a function of a sensor output (figs 1A&B and 5, accelerometer 110 or 524; pars. 0053-0054);

a data streaming buffer circuit receiving the intermittent read data stream, providing a buffer data stream (figs 1A&B and 5, cache 106 or 506; par. 0052); and

means to control energization of the data storage device (par. 0049).

Hodge teaches that acceleration interferes with the read, or fill, time from the data storage device (pars. 0031 & 0046), and that that buffer refresh operations must occur frequently enough so that read delays due to acceleration do not cause buffer underflow (pars. 0053-0054), indicating that the time to fill the data streaming buffer is variable. However, Hodge does not expressly teach the details of deciding when a buffer refresh, and the corresponding energization of the data storage device, should occur. Millikan teaches comparing time-to-fill and time-to-

exhaust estimates to control energization of a data storage device (col. 3, line 59 – col. 4, line 24; col. 4, line 55 – col. 5, line 13). At the time of the invention, it would have been to one of ordinary skill in the art to apply Millikan's comparing to Hodge's data streaming system, as time-to-fill and time-to-exhaust values are inherently related when buffer underflow will occur.

As per claim 2, Millikan teaches the control of the energization prevents exhausting of data stored in the data streaming buffer circuit (col. 4, lines 25-54).

As per claim 3, Millikan teaches the intermittent data stream has a first data transmission rate, and the buffer data stream has a second data transmission rate that is slower than the first data transmission rate (col. 1, lines 43-56).

As per claim 4, Millikan teaches the intermittent data stream refills the data streaming buffer circuit before the data streaming buffer circuit is depleted of data, so that the buffer data stream is a continuous data stream (col. 4, lines 25-54).

As per claim 5, Millikan teaches the energization cycles on and off to reduce energy consumption in the data streaming system (col. 3, lines 28-45).

As per claim 6, Millikan teaches the buffer data stream has a bit rate that is controllable by a command received from an output device (col. 3, lines 1-17).

As per claim 7, Millikan teaches the data storage device further comprises a data streaming rate estimate output that is coupled to an output device (col. 3, lines 1-17).

As per claim 8, Hodge teaches the environmental sensor comprises an acceleration sensor (figs 1A&B and 5, accelerometer 110 or 524).

As per claims 9-12, it would have been obvious to use any type of sensor that measures a property that affects the time-to-fill value.

As per claim 13, Hodge teaches the data storage device comprises a hard disc drive (par. 0004).

As per claim 14, Hodge teaches the data storage device is mounted in a portable device subject to environmental shock (par. 0032).

As per claim 15, Hodge teaches a method of data streaming, comprising:

coupling an intermittent data stream from a data storage device to a data streaming buffer circuit that provides a buffer data stream (figs. 1A&B and 5, coupling disk drive 104 or 504 to cache 106 or 506);

altering the frequency of cache refresh operations as a function of an environment sensor output (figs 1A&B and 5, accelerometer 110 or 524; pars. 0053-0054); and

controlling energization of the data storage device (par. 0049).

Hodge teaches that acceleration interferes with the read, or fill, time from the data storage device (pars. 0031 & 0046), and that that buffer refresh operations must occur frequently enough so that read delays due to acceleration do not cause buffer underflow (pars. 0053-0054), indicating that the time to fill the data streaming buffer is variable. However, Hodge does not expressly teach the details of deciding when a buffer refresh, and the corresponding energization of the data storage device, should occur. Millikan teaches comparing time-to-fill and time-to-exhaust estimates to control energization of a data storage device (col. 3, line 59 – col. 4, line 24; col. 4, line 55 – col. 5, line 13). At the time of the invention, it would have been to one of ordinary skill in the art to apply Millikan's comparing to Hodge's method of data streaming, as time-to-fill and time-to-exhaust values are inherently related when buffer underflow will occur.

As per claim 16, Millikan teaches preventing exhaustion of the buffer circuit by the controlling of energization (col. 4, lines 25-54).

As per claim 17, Millikan teaches transmitting data from the data storage device at a faster rate than transmission of data from the buffer circuit (col. 1, lines 43-56).

As per claim 18, Millikan teaches refilling the buffer circuit with data from the intermittent data stream before the buffer circuit is depleted of data (col. 4, lines 25-54).

As per claim 19, Millikan teaches reducing energy consumption in the data storage device by cycling the energization on and off (col. 3, lines 28-45).

As per claim 20, Millikan teaches controlling a bit rate of the buffer data stream by an output device (col. 3, lines 1-17).

As per claim 21, Hodge teaches the environmental sensor sensing an environmental variable selected from the group: acceleration, loss-of-read-channel-signal, humidity, temperature, low battery (par. 0023).

As per claim 22, Millikan teaches coupling a data streaming rate estimate output from the data storage device to an output device (col. 3, lines 1-17).

As per claim 14, Hodge teaches the data storage device is mounted in a portable device subject to environmental shock (par. 0032).

As per claim 24, Hodge teaches a data streaming system, comprising:

a data storage device providing an intermittent read data stream (figs 1A&B and 5, disk drive 104 or 504; par. 0032); the data storage device also including an environment sensor and

altering the frequency of cache refresh operations as a function of a sensor output (figs 1A&B and 5, accelerometer 110 or 524; pars. 0053-0054);

a data streaming buffer circuit receiving the intermittent read data stream, providing a buffer data stream (figs 1A&B and 5, cache 106 or 506; par. 0052); and

means to control energization of the data storage device (par. 0049).

Hodge teaches that acceleration interferes with the read, or fill, time from the data storage device (pars. 0031 & 0046), and that that buffer refresh operations must occur frequently enough so that read delays due to acceleration do not cause buffer underflow (pars. 0053-0054), indicating that the time to fill the data streaming buffer is variable. However, Hodge does not expressly teach the details of deciding when a buffer refresh, and the corresponding energization of the data storage device, should occur. Millikan teaches comparing time-to-fill and time-to-exhaust estimates to control energization of a data storage device (col. 3, line 59 – col. 4, line 24; col. 4, line 55 – col. 5, line 13). At the time of the invention, it would have been to one of ordinary skill in the art to apply Millikan's comparing to Hodge's data streaming system, as time-to-fill and time-to-exhaust values are inherently related when buffer underflow will occur.

As per claim 25, Millikan teaches the control of the energization prevents exhausting of data stored in the data streaming buffer circuit (col. 4, lines 25-54).

As per claim 26, Millikan teaches the controlling of energization reduces energy consumption on the data streaming system (col. 3, lines 28-45).

As per claim 27, Hodge teaches the environmental sensor senses acceleration (figs 1A&B and 5, accelerometer 110 or 524).

Examiner's note:

Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

(10) Response to Argument

Applicant argues on page 7, lines 9-10:

> "Hodge does not teach or suggest 'control of energization of a data storage device'".

Applicant appears to be misunderstanding Hodge's interpretation of "file system." Hodge teaches controlling energization of a file system (par. 0049, "once the media data for the particular media item has been loaded into the cache 506, the file system 504 can be inactivated (e.g., placed in a low power mode) to save power consumption …"). Hodge teaches file system 504 as a disk drive (fig. 1, disk drive 104; fig. 5, disk drive (storage disk) 504; par. 0053, "the file system 504 (disk drive)"), which is clearly a data storage device.

Applicant argues against the references individually:

> "Hodge also does not teach or suggest a 'time-to-fill estimate'" (page 7, lines 10-11);
>
> "Millikan does not teach or suggest a 'time-to-fill estimate'" (page 7, line 27); and

> "The time-to-fill estimate is a variable that is based on an environmental sensor, while the 'CD player restart time' is not taught to be a variable" (page 8, lines 10-12).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Millikan teaches comparing a 'time-to-exhaust estimate' to a 'time-to-fill estimate' (fig. 3, steps 58-60, compare cached audio playback time to CD restart time; col. 4, lines 55 – col. 5, line 13) to prevent buffer underflow (Abstract; col. 4, lines 25-54). This concept of comparing is to be applied to Hodge's system, in which read requests to the data storage device are delayed based on acceleration sensor measurements of vibration. As explained further below, the time to fill Hodge's data streaming buffer is variable because Hodge introduces delays that vary with vibration.

Applicant appears to be arguing that Millikan does not teach a *variable* time-to-fill estimate. Millikan determines a CD player restart time that varies for different CD players, but is constant for an individual CD player (col. 4, lines 19-21, "The length of the CD player restart time is a known quantity and can be determined for each CD player"). The CD restart time accounts for the collective number of delays encountered to fill a buffer memory (col. 4, lines 7-12, "CD player restart time is the collective time required to fully repower the CD player, … , fill memory 26"). The CD restart time remains unchanged if each of the delay components is constant. Accounting for the collective delays in Hodge's system would result in a variable "time-to-fill estimate."

The varying frequency of buffer refresh operations in one embodiment of Hodge indicates that the time to fill the buffer is variable. Hodge teaches estimating vibration as a function of sensor measurements and preemptively processing buffer refresh operations more frequently, based on these estimates, to prevent "dead air" or buffer underflow from exhaustion of data in the buffer:

> "When substantial levels of acceleration have been detected, estimated or predicted …" (par. 0031);
>
> However, the size of the media item is usually larger than the size of the cache 506. As a result, the cache 506 must be periodically refreshed with a next remaining portion of the media data. … The refresh process occurs periodically and must be promptly achieved in order to not introduce "dead air" or "quiet periods" when the media player 500 is playing the media item. (par. 0053); and
>
> "The accelerometer 524 can provide an indication of acceleration induced in the media player ... so that access to the disk drive is performed in a safe and power-efficient manner … could also take preemptive actions to process refresh operations more frequently so that imposed delay due to vibrations does not cause 'dead air' or 'quiet periods' in the audio output" (par. 0054).

When vibration is present, Hodge compensates for added delays by processing refresh operations more frequently at reduced time intervals. The time interval between refresh operations is reduced because the system needs an earlier head start to refresh the buffer, as the time required to fill the buffer is increased.

The time to fill the buffer increases because Hodge introduces a delay period for read accesses to the disk drive based on vibration:

> "when … the vibration present … is excessive, the read or write request is deferred … The period of time can be based on current vibration information or a history of vibration information" (par. 0046).

Since this added delay varies with intermittent vibration, the time to fill the buffer varies with vibration. For example, if the delay period is increased, the actual filling of the buffer is delayed

further, so that the overall time to fill is increased. When no vibration is present, the delay period is not implemented, or becomes zero, and does not add to the overall time to fill value.

In short, when Millikan's concept of comparing is applied to Hodge's system, the resulting "time-to-fill estimate" would vary as a function of acceleration sensor output. Implicit in Hodge is an algorithm that prevents buffer underflow by accounting for delays that are directly related to varying time to fill values. In view of Millikan's comparator means, it would have been obvious to use an algorithm that compares a variable "time-to-fill estimate."

Similarly, Millikan teaches a "time-to-exhaust estimate" calculation based on the amount of data left in the buffer and the bit rate of compression used: "The cached audio playback time is unaccessed memory count (expressed in bits) divided by the bit rate of the compressed audio in the cache" (col. 4, lines 1-5 and 21-24). This calculation is applicable to Hodge.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Albert Wang/

Examiner, Art Unit 2115

Conferees:

/Chun Cao/

Primary Examiner, Art Unit 2115

/Eddie C Lee/

Supervisory Patent Examiner, TC 2100